

# PATENT SPECIFICATION

926,749

DRAWINGS ATTACHED.

926,749



Date of Application and filing Complete Specification :  
March 7, 1962. No. 8721/62.

Application made in France (No. 854,925) on March 8, 1961.

Complete Specification Published : May 22, 1963.

Index at Acceptance :—Classes 120(3), FX; 42(2), R1; and 120(1), BID.

International Classification :—D01b (D04h).

## COMPLETE SPECIFICATION.

### Improvements in or relating to the Manufacture of Heat-Resistant Mats of Thermoplastic Mineral Materials.

We, COMPAGNIE DE SAINT-GOBAIN, 62 Boulevard Victor Hugo, Neuilly-sur-Seine, (Seine), France, a French Body Corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the manufacture of mats, felts, plates and sheets of thermoplastic mineral fibres, for instance glass fibres, which are capable of resisting high temperatures. For the sake of brevity in this Specification (including the claims) "mats, felts, plates and sheets" will be referred to simply as "mats" and "thermoplastic mineral fibres" will be referred to simply as "glass fibres".

It is known that when glass fibre mat is heated above a certain temperature it commences to frit or fuse together, which effect increases as the temperature rises. It is therefore necessary, for resisting high temperatures, to use special glass and the manufacture of fibres from such glass is difficult.

An object of the invention is to avoid fritting of the fibres and to obtain products resistant to high temperatures using glass fibres of ordinary quality.

According to this invention there is provided a process for obtaining a glass fibre mat resistant to high temperature, wherein a mixture of glass fibres and a material is projected on to a support, the material either having a resistance to heat higher than glass or being transformable on heating to provide protection for the fibres against heat, and the proportion of the material in the mixture being increased during projection so as to obtain a mat whose density increases progressively from one of its faces to the other.

The increase in the quantity of material thus introduced in the fibres may be progressive in a continuous manner or by stages.

For the material introduced into the fibres one may use for example, diatoms, siliceous fossils (kieselguhr), infusorial earth, flakes of mica, powdered clay. These materials all have large surface area and are more refractory than glass fibre, and it is possible to cover a large part of the fibres, which are intended to be brought to the highest temperatures to which the product may be submitted, in a magma of the material.

The process of the invention enables one to avoid fritting and softening of the glass fibres, as the glass can react to some extent with the material. Shrinkage is very considerably reduced and the various layers of products obtained are able to show, from a thermal point of view, a maximum efficiency depending on their working temperature.

Thus for example according to the invention it is possible to obtain a product which, in a zone adjoining one of its faces, is able to withstand temperatures of the order of 700° C., this zone comprising 25 to 30% of glass fibres and 70 to 75% of kieselguhr, and the latter may be lightly agglomerated on the fibre by a binder of phenolic type or a mineral binder, sodium silicate or silica gel. At temperatures above 700° C. the product agglomerates owing to the reaction of the fibres on the kieselguhr. A second zone of this product may be composed of 50% of glass fibres and 50% of kieselguhr and the last zone may be formed solely of glass fibres.

According to the invention one may use soluble salts which, when brought to a high temperature, give more or less refractory oxides absorbed on the surface of the fibres giving a coating which prevents both fritting

[P: ]

and softening of the fibres. Thus for example one may use aluminium salts precipitated on the fibre in an alkaline medium, giving a refractory alumina gel. With the same object one may also incorporate with the fibres a metal which, during heating, causes an attack on the glass or oxidises giving refractory oxides.

It is also possible to incorporate products which show the phenomenon of endothermic decomposition at moderate or high temperature, which allows of stopping for a time the rise in temperature when the products are subjected to abnormal temperature conditions. For example one may use hydrated substances which firstly liberate their water at a certain temperature, then decompose into oxides with a considerable absorption of heat, for example barium sulphate and calcium sulphate, or clays, or numerous hydrated salts.

The invention will now be described in more detail by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a diagrammatic side elevation of apparatus for carrying out the invention;

Figure 2 is a section through one mat in accordance with the invention; and

Figure 3 is a section through another mat in accordance with the invention.

In Figure 1 is shown apparatus for producing glass fibres in well-known manner by spinners 1, 1a, 1b, and 1c rotating at high speed and having a peripheral band provided with holes through which the molten glass is ejected centrifugally in the form of streamlets which are then attenuated into fine fibres by a gas blast coming from slits in the combustion chambers 2, 2a, 2b, and 2c coaxial with the spinners.

Under each spinner are injection or pulverisation devices 3, 3a, 3b, and 3c, which introduce into the fibres the finely divided materials which are to be incorporated into the mat. The number of these devices increases from the first spinner 1 to the last 1c.

The fibres, into which have been introduced the material from the injection or pulverisation devices, are received on a belt 4 which passes above a suction hood 5.

Leaving the apparatus is a mat of glass fibres to which has been added the material introduced by the injection or pulverisation devices. Such a mat is shown in Figure 2. It has four layers 6, 6a, 6b, and 6c, the percentage of material introduced with respect to that of the glass fibres being substantially constant in each layer but increasing in four stages from the top layer to the lowest.

It is also possible, as shown in Figure 3, to obtain a mat 7 in which the quantity of material introduced increases regularly from one face of the mat to the other. This may be obtained for example by a suitable ar-

rangement of the pulverisation and injection devices introducing a regularly increasing quantity of material into the fibres.

#### WHAT WE CLAIM IS:—

1. A process for obtaining a glass fibre mat resistant to high temperature, wherein a mixture of glass fibres and a material is projected on to a support, the material either having a resistance to heat higher than glass or being transformable on heating to provide protection for the fibres against heat, and the proportion of the material in the mixture being increased during projection so as to obtain a mat whose density increases progressively from one of its faces to the other.

2. A process according to Claim 1 wherein the mat density increases progressively by stages.

3. A process according to Claim 1 wherein the mat density increases progressively in a continuous manner.

4. A process according to any one of Claims 1 to 3, wherein the support is a conveyor belt.

5. A process according to Claim 4 wherein a number of fibre-producing spinners are arranged above the belt and successively in the direction of belt movement, a device or devices being associated with each spinner for introducing the material into the fibres produced by each spinner, such that the quantity of material introduced increases progressively from the first spinner to the last.

6. A process according to any one of the preceding claims, wherein the material is of diatoms, siliceous fossils (kieselguhr), infusorial earth, mica flakes or powdered clay.

7. A process according to any one of Claims 1 to 5, wherein the material is such as to form a refractory coating on the surface of the fibres when the latter are subjected to a high temperature.

8. A process according to Claim 7, wherein the material is an aluminium salt.

9. A process according to any one of Claims 1 to 5, wherein the material is such as to decompose endothermically under the action of heat.

10. A process according to Claim 9, wherein the material is barium sulphate or calcium sulphate.

11. A glass fibre mat resistant to high temperature wherein a finely divided material is incorporated in the mass of fibres in such a manner that the surface of the mat to be subjected to the high temperature contains the highest proportion of the said material, which is such as to prevent fritting of the fibres at the high temperature.

12. A mat according to Claim 11, where-

in the proportion of incorporated material increases progressively by stages from one face of the mat to the other.

- 5 13. A mat according to Claim 11, where-  
in the proportion of incorporated material increases progressively in a continuous manner from one face of the material to the other.

14. A process for obtaining a glass fibre

mat resistant to high temperature, substantially as herein described, with reference to the accompanying drawings. 10

WITHERS & SPOONER,  
Chartered Patent Agents,  
148—150 Holborn,  
London, E.C.1,  
Agents for the Applicants.

Abingdon : Printed for Her Majesty's Stationary Office, by Burgess & Son (Abingdon), Ltd.—1963.  
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2,  
from which copies may be obtained.

FIG.1.

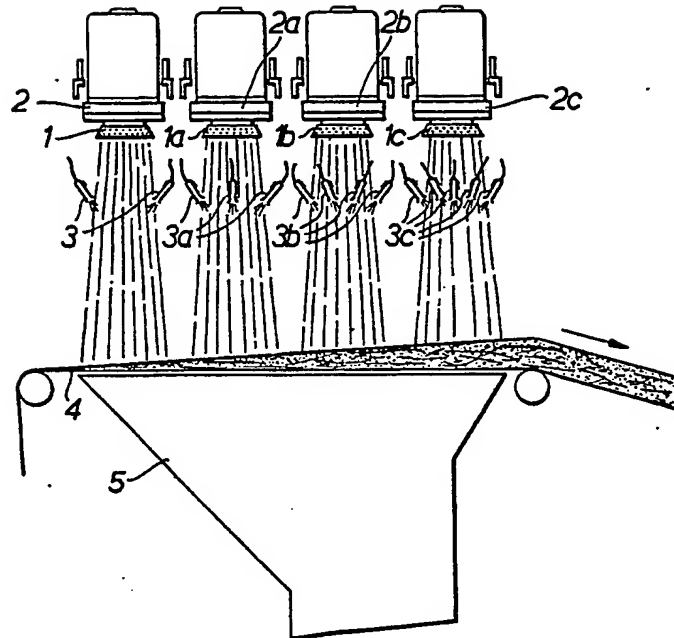


FIG.2.

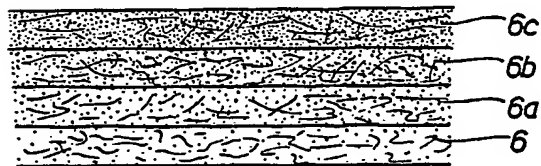


FIG.3.

